

Southwest Groundwater Project Background Information



SOUTHWEST JORDAN VALLEY **GROUNDWATER** PROJECT

Mark Atencio

March 2010



JORDAN VALLEY WATER
CONSERVANCY DISTRICT

Delivering Quality Every Day

Presentation Outline

- Who is Jordan Valley Water?
- What is this project about?
- What are the benefits of this project?
- How does reverse osmosis work?
- What is by-product?
- What by-product disposal alternatives were considered?
- UPDES permit details (slide show #2)

GREAT SALT LAKE

MOUNTAIN DELL RESERVOIR

JVWCD Service Area

JORDANELLE RESERVOIR

JORDAN AQUEDUCT

JORDAN RIVER

SALT LAKE AQUEDUCT

POINT OF THE MOUNTAIN AQUEDUCT

JORDAN AQUEDUCT

SALT LAKE AQUEDUCT

DEER CREEK RESERVOIR

PROVO RESERVOIR CANAL

PROVO RIVER

UTAH LAKE

Legend



Treatment Plants

JVWCD Service Area

Aqueducts operated by JVWCD

Aqueducts operated by MWDSL

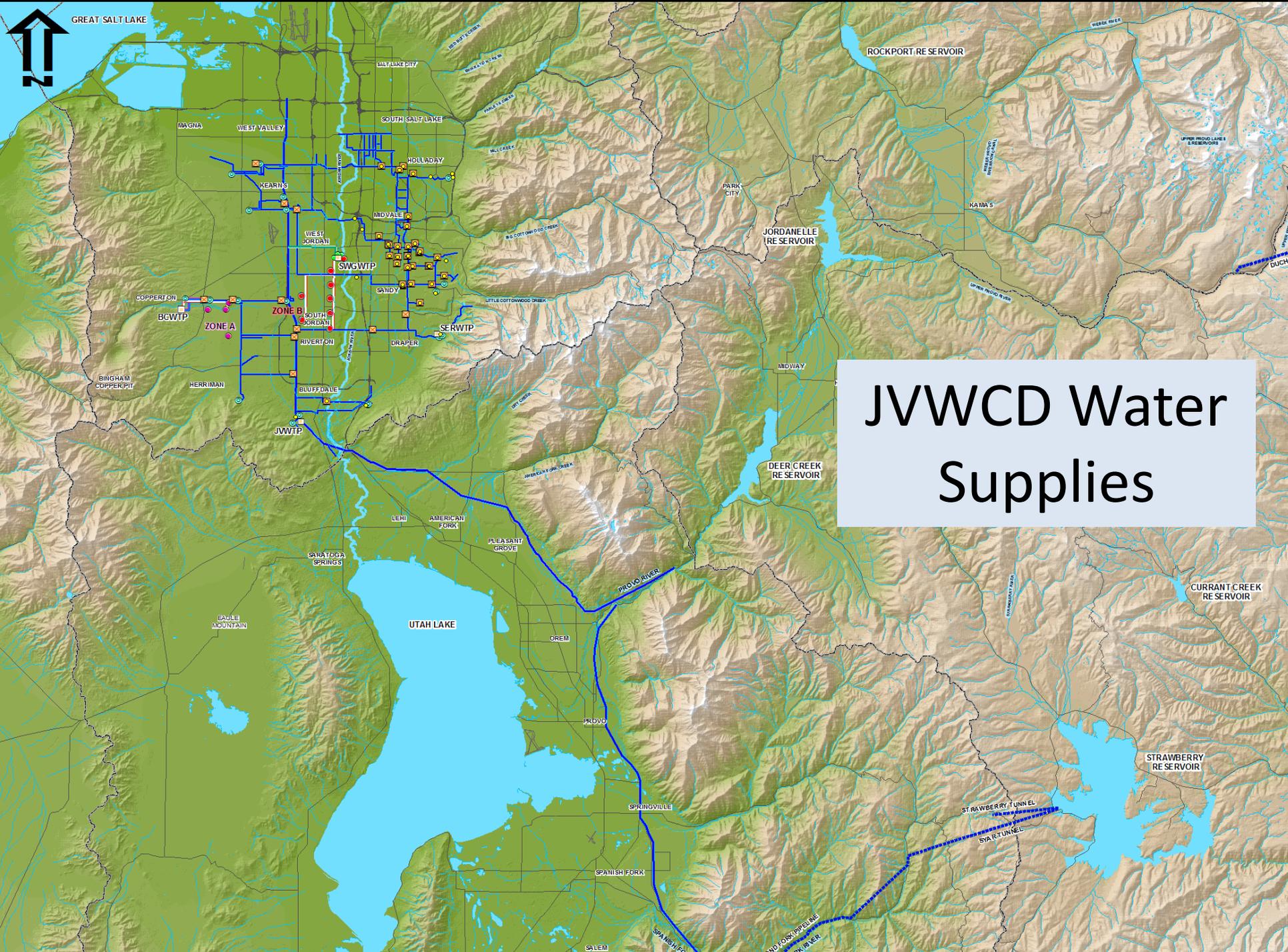


Existing District Water Supplies

- Mountain Snowmelt
 - Provo, Weber & Colorado Rivers
- Local Groundwater

JVWCD Member Agencies

Cities	Improvement Districts	Other
Bluffdale	Taylorsville-Bennion	Department of Corrections
Draper	Granger-Hunter	Hexcel
Midvale	Kearns	Draper Irrigation
Herriman	Magna	Willow Creek Country Club
Riverton	White City	
South Jordan		
West Jordan		
South Salt Lake		



JWCD Water Supplies

Water Demands

- Existing Demands:
 - 84,000 AF/yr (2008)
- Future Demands:
 - 180,000 – 200,000 AF/yr (2100)

Future District Water Supplies

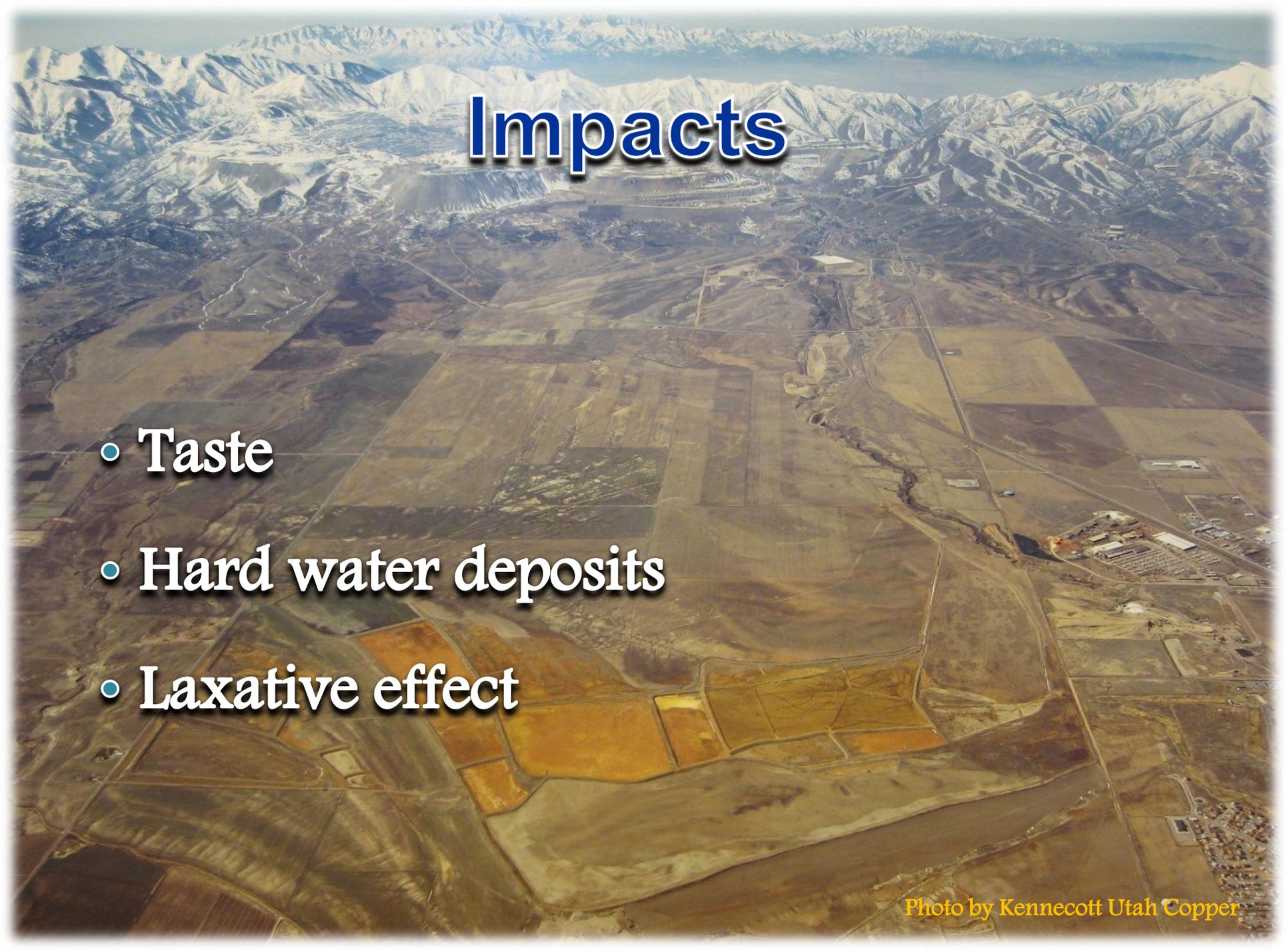
- Local Groundwater
- Colorado River Diversions
- Wastewater Recycling
- Lower Quality Local Groundwater
(Reverse Osmosis Treatment Required)

Historical Mining

- 100 Years of Copper Mining
- Two groundwater plumes
- Calcium Sulfate (SO_4 – Gypsum)

Photo by Kennecott Utah Copper

Impacts

An aerial photograph of a valley with snow-capped mountains in the background. The foreground shows a patchwork of agricultural fields, some of which are brown and some are green. A river or stream flows through the valley. The word "Impacts" is written in large blue letters with a white outline in the upper center of the image.

- Taste
- Hard water deposits
- Laxative effect

Unmitigated Impact

- Plumes moving towards hundreds of existing high quality municipal wells
- Unusable groundwater in SW Salt Lake Valley

2007 SO4 CONCENTRATIONS



SOUTHWEST JORDAN VALLEY
GROUNDWATER
PROJECT



Selenium Concerns

- Not caused by mining activities
- Selenium is found naturally in Salt Lake Valley groundwater

Natural Resource Damage Claim

- Natural Resource Damage Claim by State of Utah
 - District involvement in federal court
 - Settlement leads to Trust Fund set up by mining company
 - Rio Tinto (previously Kennecott Utah Copper Company)
 - State Trustee for Natural Resources
 - Dianne Nielson, Director of Utah Department of Environmental Quality
- Public Involvement

RioTinto



JORDAN VALLEY WATER
CONSERVANCY DISTRICT

Delivering Quality Every Day



Southwest Jordan Valley Groundwater Project



JORDAN VALLEY WATER
CONSERVANCY DISTRICT

Delivering Quality Every Day

Mark Atencio, P.E.
Engineering Department Manager
Jordan Valley Water Conservancy District



Doug Bacon
Project Manager
Utah Dept. of Environmental Quality

RioTinto

Kelly Payne
Remediation Manager
Rio Tinto Kennecott Utah Copper

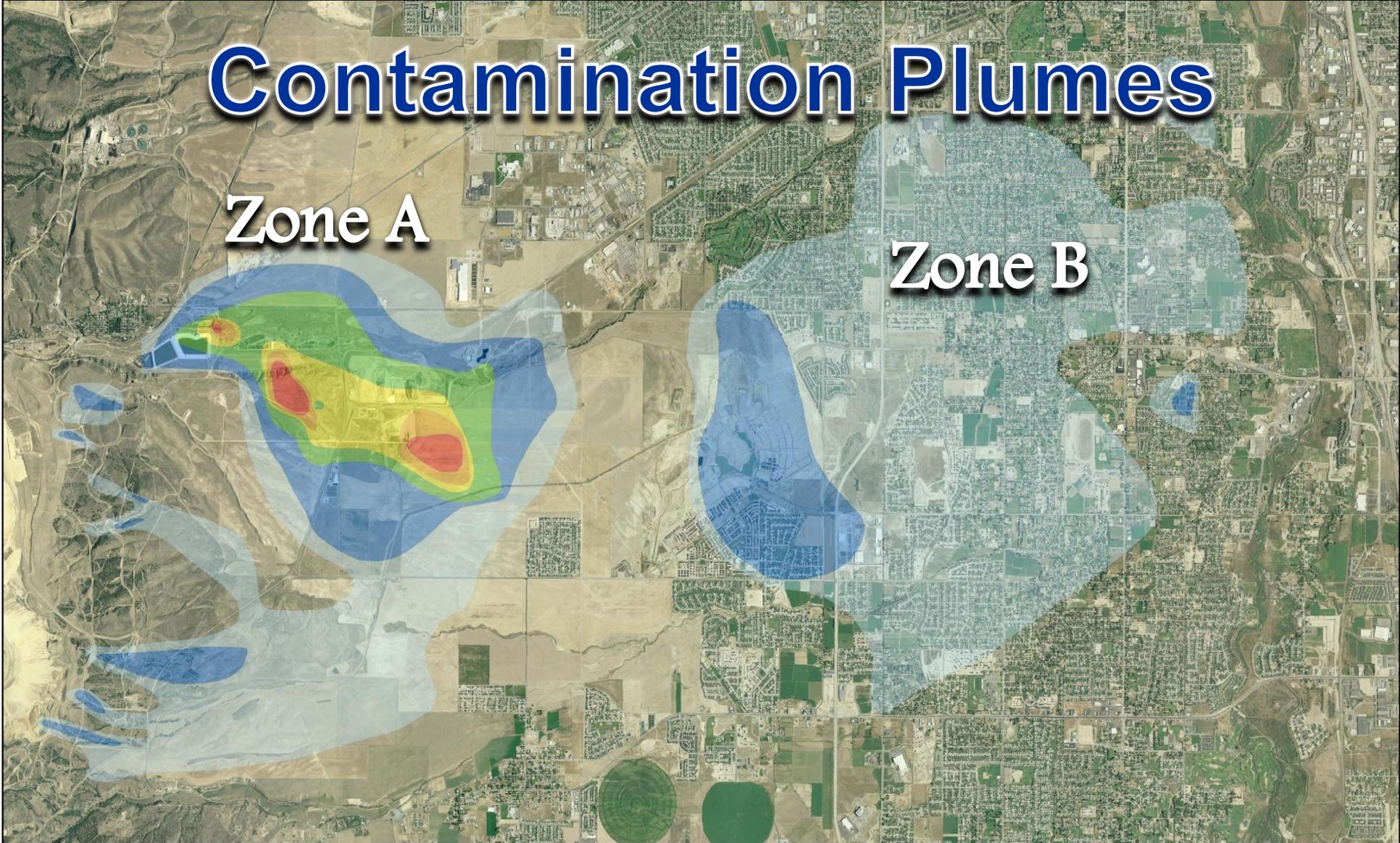
Solution – Project Proposal

- Joint Project Proposed
 - Kennecott Utah Copper – Zone A Plume
 - Jordan Valley Water – Zone B Plume
- Facilities for Each Plume
 - Wells
 - Pipelines
 - Reverse Osmosis Treatment Plant
 - Byproduct Disposal (Concentrate)

Contamination Plumes

Zone A

Zone B



2007 SO4 CONCENTRATIONS

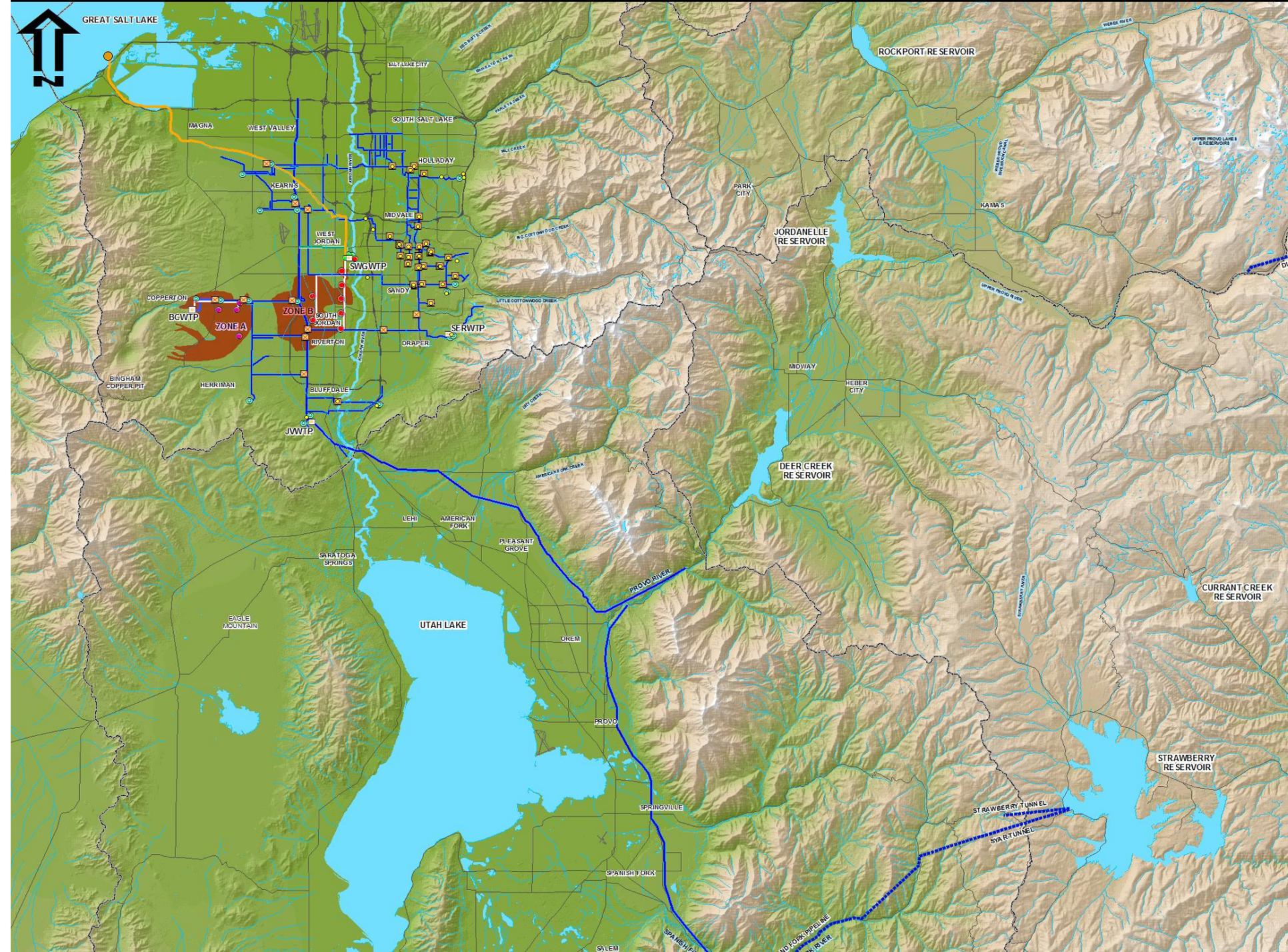
- 20,000+ SO4 mg/L
- 15,000 - 19,999 SO4 mg/L
- 10,000 - 14,999 SO4 mg/L
- 5,000 - 9,999 SO4 mg/L
- 1,500 - 4,999 SO4 mg/L
- 500 - 1,499 SO4 mg/L



SOUTHWEST JORDAN VALLEY
GROUNDWATER
PROJECT

0 3,500 7,000
Feet





Migration of Plumes

If unchecked: the plumes will
continue migrating:

- east by northeast direction

Migration of Plumes

If unchecked: the plumes will continue migrating towards:

- existing municipal wells,
- the Jordan River, and
- Great Salt Lake.

Project Benefits

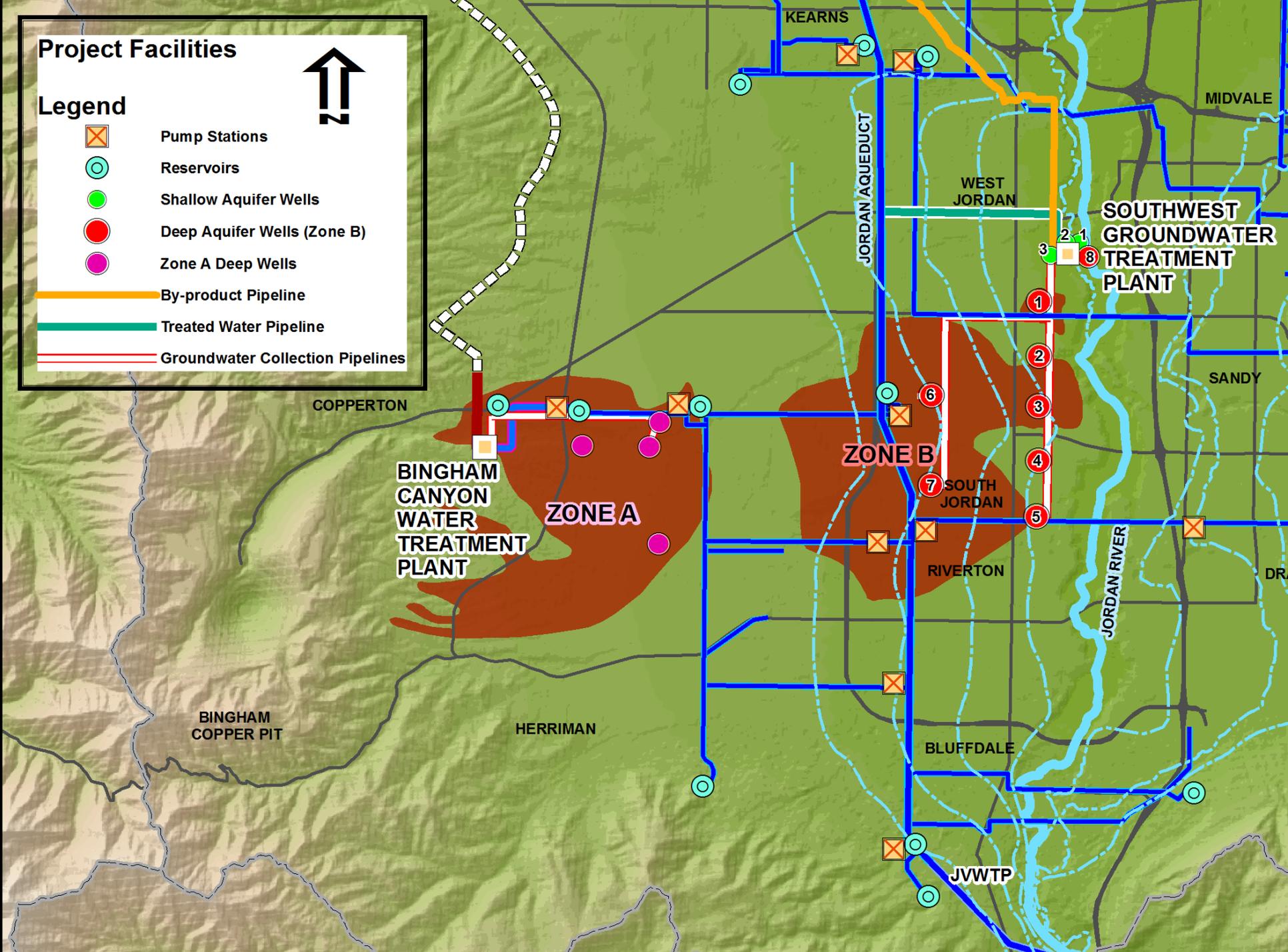
1. Plumes are Contained
2. Aquifer is Remediated
3. New Water Supply for the Public

Project Facilities



Legend

-  Pump Stations
-  Reservoirs
-  Shallow Aquifer Wells
-  Deep Aquifer Wells (Zone B)
-  Zone A Deep Wells
-  By-product Pipeline
-  Treated Water Pipeline
-  Groundwater Collection Pipelines



COPPERTON

BINGHAM CANYON WATER TREATMENT PLANT

ZONE A

ZONE B

SOUTHWEST GROUNDWATER TREATMENT PLANT

BINGHAM COPPER PIT

HERRIMAN

BLUFFDALE

JVVWTP

KEARNS

MIDVALE

WEST JORDAN

SANDY

SOUTH JORDAN

RIVERTON

JORDAN RIVER

JORDAN AQUEDUCT

Zone A Plant

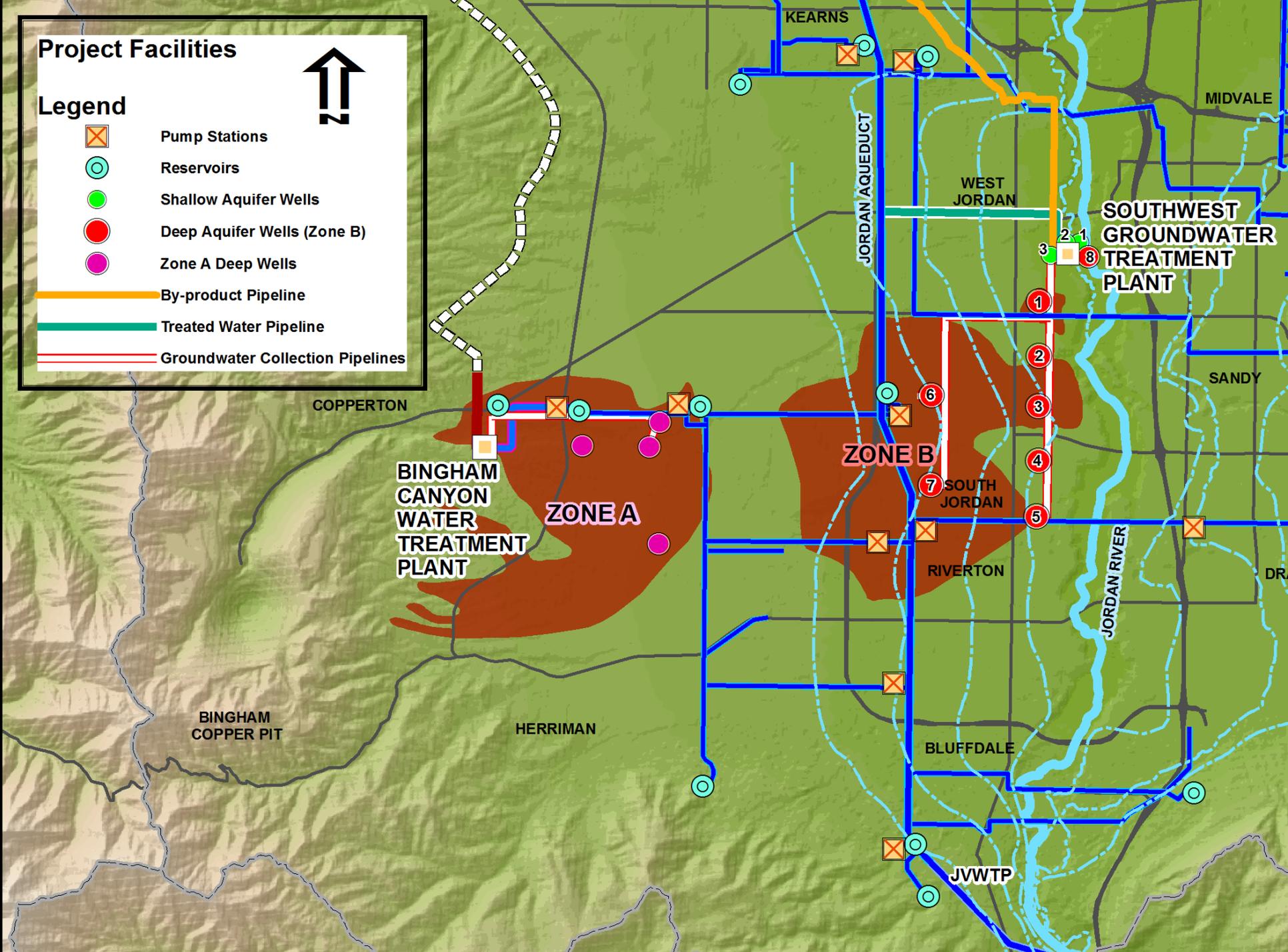


Project Facilities



Legend

-  Pump Stations
-  Reservoirs
-  Shallow Aquifer Wells
-  Deep Aquifer Wells (Zone B)
-  Zone A Deep Wells
-  By-product Pipeline
-  Treated Water Pipeline
-  Groundwater Collection Pipelines



COPPERTON

BINGHAM CANYON WATER TREATMENT PLANT

ZONE A

ZONE B

SOUTH JORDAN

RIVERTON

BLUFFDALE

JVVWTP

KEARNS

JORDAN AQUEDUCT

WEST JORDAN

SOUTHWEST GROUNDWATER TREATMENT PLANT

MIDVALE

SANDY

JORDAN RIVER

BINGHAM COPPER PIT

HERRIMAN

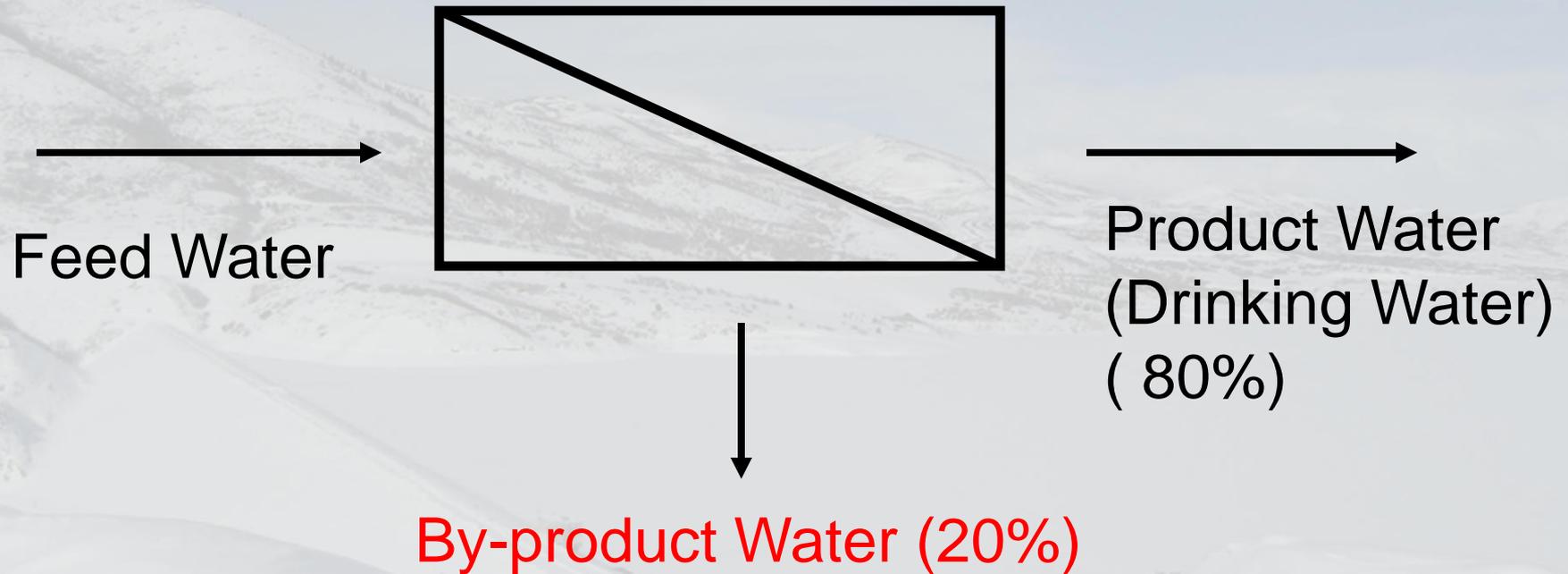
DR

Water Supply Project

- Zone A 3,500 AF
(deep groundwater, by KUCC)
- Zone B 3,500 AF
(deep groundwater, by JVWCD)
- Lost Use 1,235 AF
(shallow groundwater, by JVWCD)

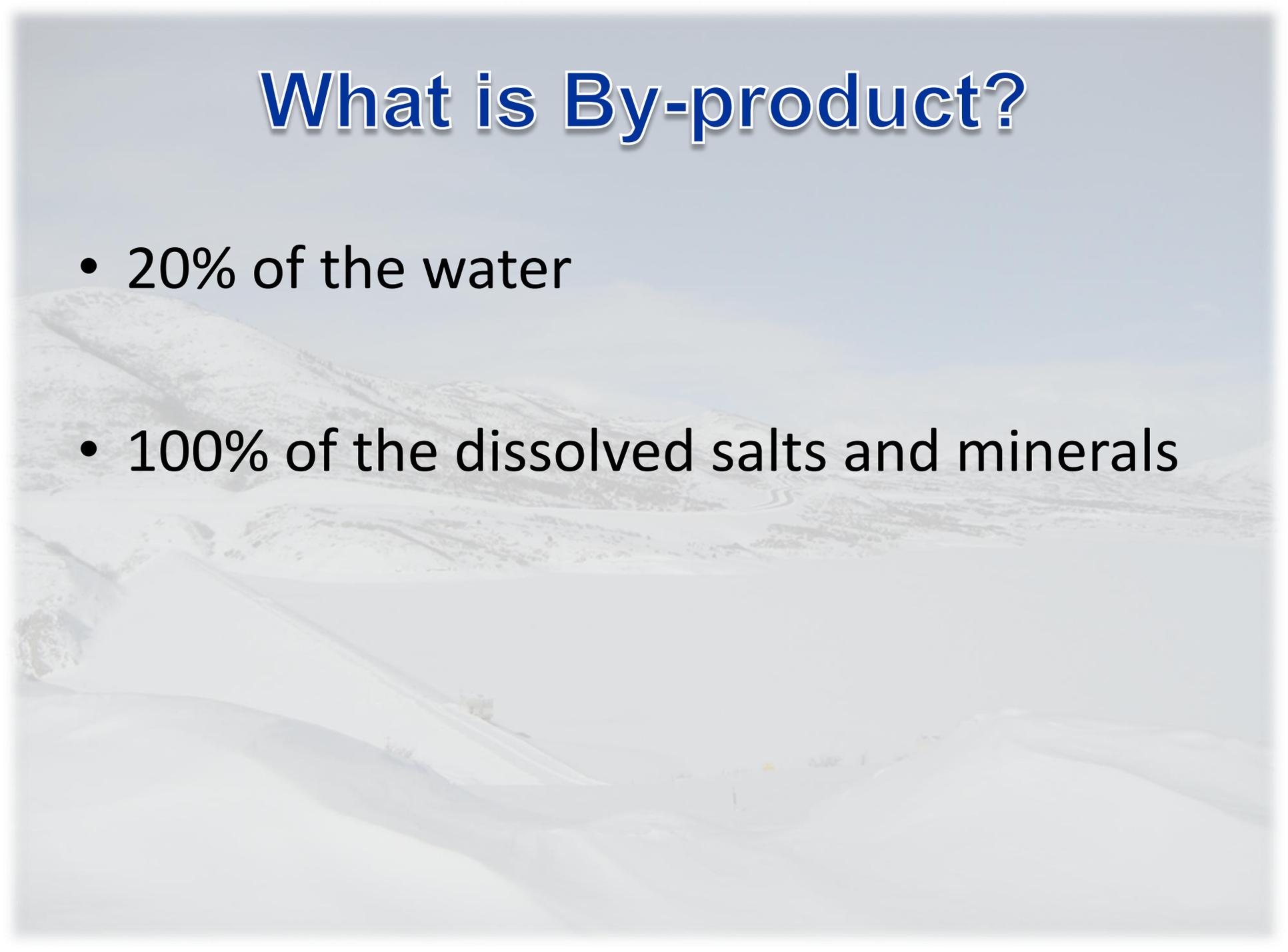
TOTAL 8,235 AF

Zone B and Lost Use Reverse Osmosis By-Product

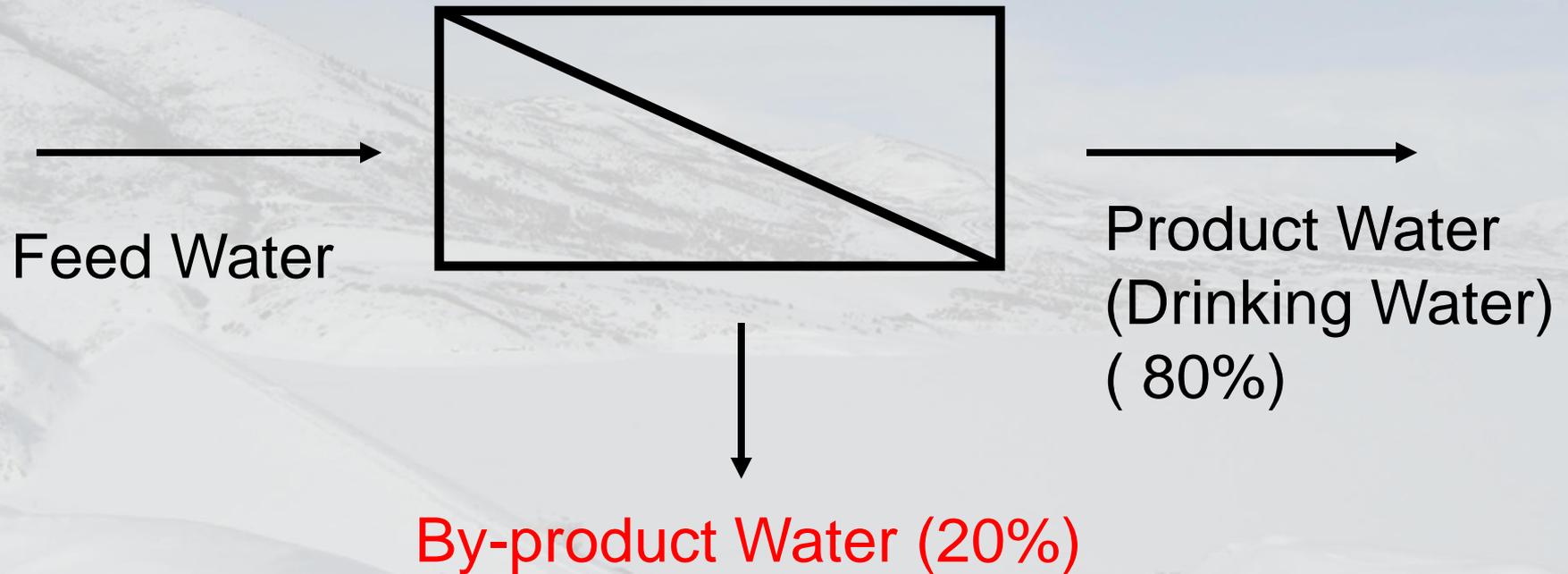


What is By-product?

- 20% of the water
- 100% of the dissolved salts and minerals



Zone B and Lost Use Reverse Osmosis By-Product

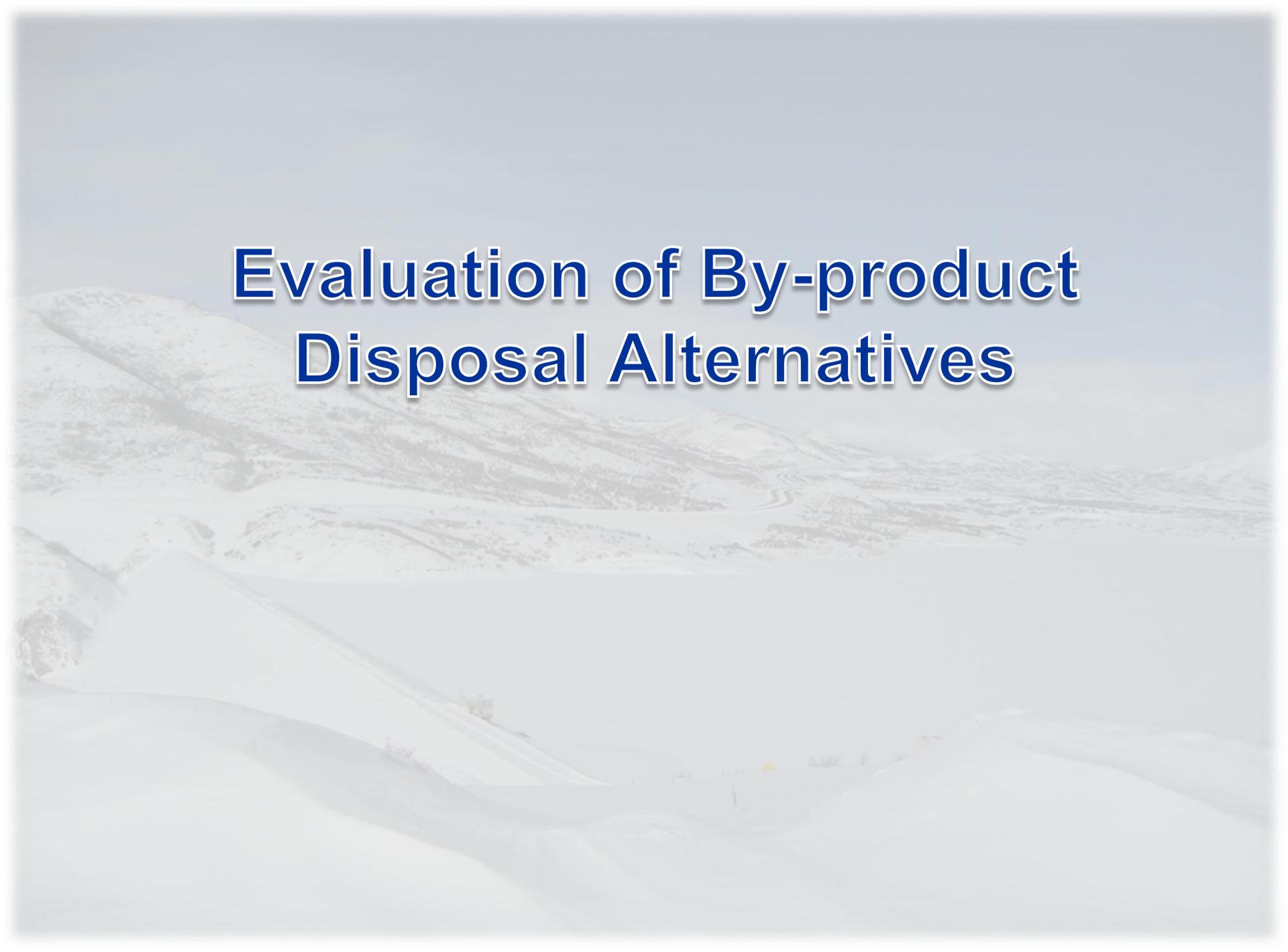


What is the By-product?

- Clear, Salty Liquid
- How Salty?
 - Less than Great Salt Lake and the ocean
 - More than Jordan River and irrigation canals

What is the Potential Concern with By-product in Great Salt Lake?

- Selenium (could affect wildlife)
- Mercury (could affect wildlife)

An aerial photograph of a large industrial or mining site, possibly a waste management or processing facility. The site is characterized by numerous large, rectangular structures, roads, and what appears to be a large body of water or a containment area. The surrounding landscape is hilly and somewhat barren. The image is faded and serves as a background for the title text.

Evaluation of By-product Disposal Alternatives

Southwest Groundwater Stakeholder Forum

(2004 DEQ slides)

- Convened by Trustee (see Attachment 1)
- Membership:
 - Well owners (2)
 - Environmental representatives (2)
 - Duck clubs (1)
 - Municipalities (6)
 - Federal agencies (3)
 - State agencies (3)
 - Project proponents (2)



Forum Meeting No. 1

Established Project Objectives:

- Joint Proposal Project:
Select an alternative for disposal of Zone B and Lost Use RO by-product water
- JWCD Future (Phase 2) Project:
Select an alternative for disposal of RO by-product from a shallow groundwater treatment project



Forum Meeting No. 1

Established Criteria for selecting Alternative(s):

1. Meets project objectives
2. Keeps within budget
3. Meets project time constraints
4. Environmentally sound
5. Technically feasible
6. Allows all organizations to meet their objectives
7. Allows public water delivery after 40 years
8. Compatible with JWCD Phase 2 project
(additional shallow groundwater)
9. Legal/permittable



Forum Meeting No. 2

Developed discharge/disposal alternatives:

- A. No action
- B. To Jordan River (withdrawn)
- C. Deep well injection
- D. To Great Salt Lake
- E. To KUCC GSL outfall pipe
- F. To KUCC Tailings Impoundment (Zone B only)
- G. Evaporation
- H. Distillation
- I. To KUCC Tailings Pipeline (Zone B only)

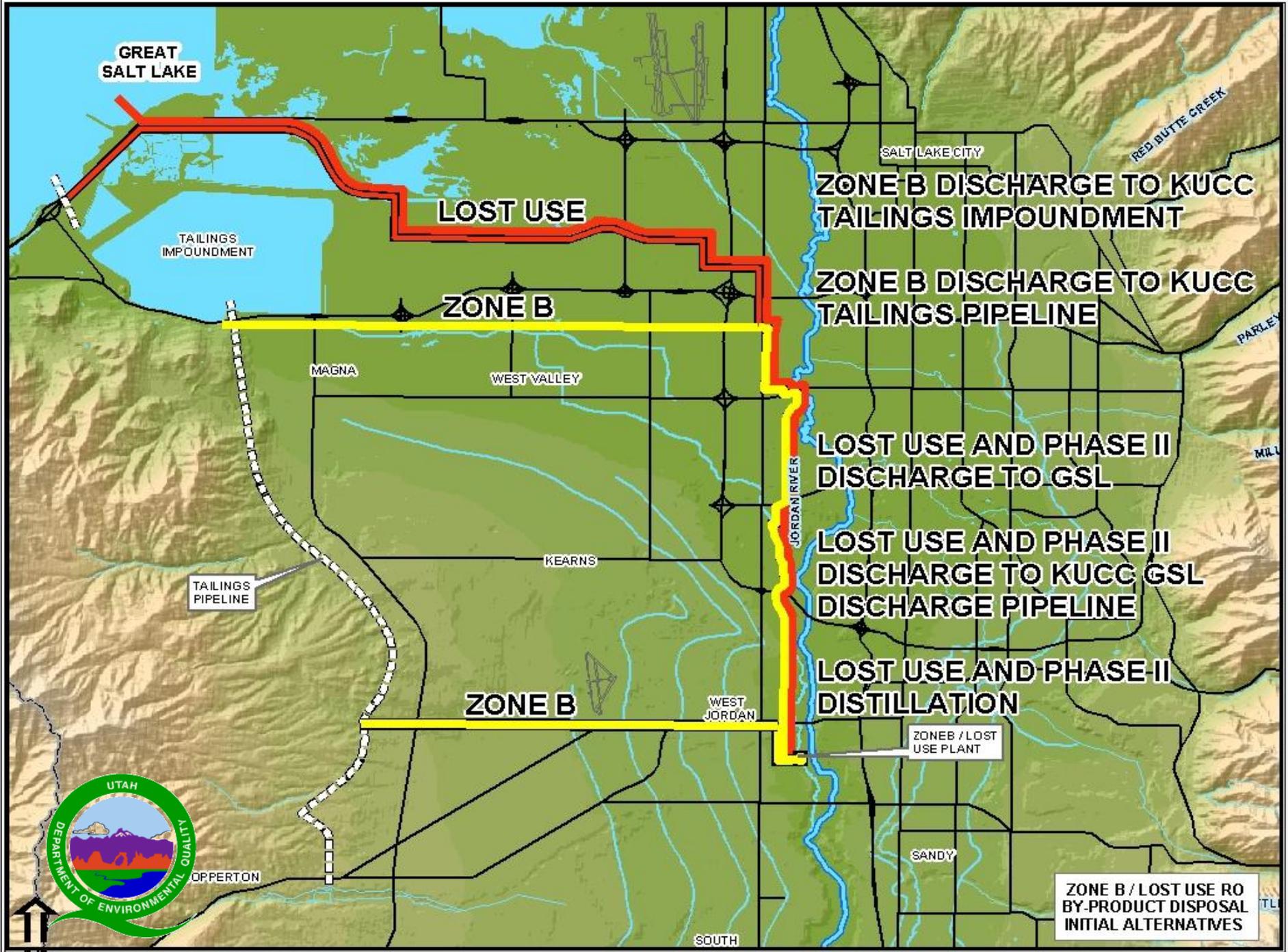


Forum Meeting No. 2

Alternatives:

- F.1 Zone B to Tailings Impoundment; Lost Use to GSL
- F.2 Zone B to Tailings Impoundment; Lost Use to KUCC
GSL outfall
- F.3 Zone B to Tailings Impoundment; Lost Use to
distillation
- I.1 Zone B to Tailings Pipeline; Lost Use to GSL
- I.2. Zone B to Tailings Pipeline; Lost Use to KUCC GSL
Outfall
- I.3 Zone B to Tailings Pipeline; Lost Use to distillation





GREAT SALT LAKE

TAILINGS IMPOUNDMENT

TAILINGS PIPELINE

LOST USE

ZONE B

MAGNA

WEST VALLEY

KEARNS

ZONE B

WEST JORDAN

SALT LAKE CITY

ZONE B DISCHARGE TO KUCC TAILINGS IMPOUNDMENT

ZONE B DISCHARGE TO KUCC TAILINGS PIPELINE

LOST USE AND PHASE II DISCHARGE TO GSL

LOST USE AND PHASE II DISCHARGE TO KUCC
GSL DISCHARGE PIPELINE

LOST USE AND PHASE II DISTILLATION

ZONE B / LOST USE PLANT

JORDAN RIVER

RED BUTTE CREEK

PARLEY

MILL



OPPERTON

SANDY

SOUTH

ZONE B / LOST USE RO BY-PRODUCT DISPOSAL INITIAL ALTERNATIVES

2004 Cost Summary

ALTERNATIVE	To Jordan River (B)	To GSL (D)	To KUCC GSL Outfall (E)	Zone B to Tailings Impoundment (F) ZONE B ONLY	Distillation (H)	Zone B to Tailings Pipeline (I) ZONE B ONLY
Capital Cost (\$million)	\$6.4	\$9.3	\$9.9	\$7.7	\$22.1	\$5.6
Operating Cost (\$/year)	\$0	\$20,000	\$25,000	\$25,000	\$3,200,000	\$72,000
NPV Cost (\$million)	\$4.6	\$9.7	\$10.4	\$8.2	\$93.9	\$7.0
Additional Capital Cost (\$million) (a)	\$0	\$2.9	\$3.5	\$1.3	\$15.7	(\$.8)
Unit Cost (\$/acre feet)	\$157	\$201	\$207	\$209	\$928	\$195

(a) Additional capital cost is relative to \$6.4 million

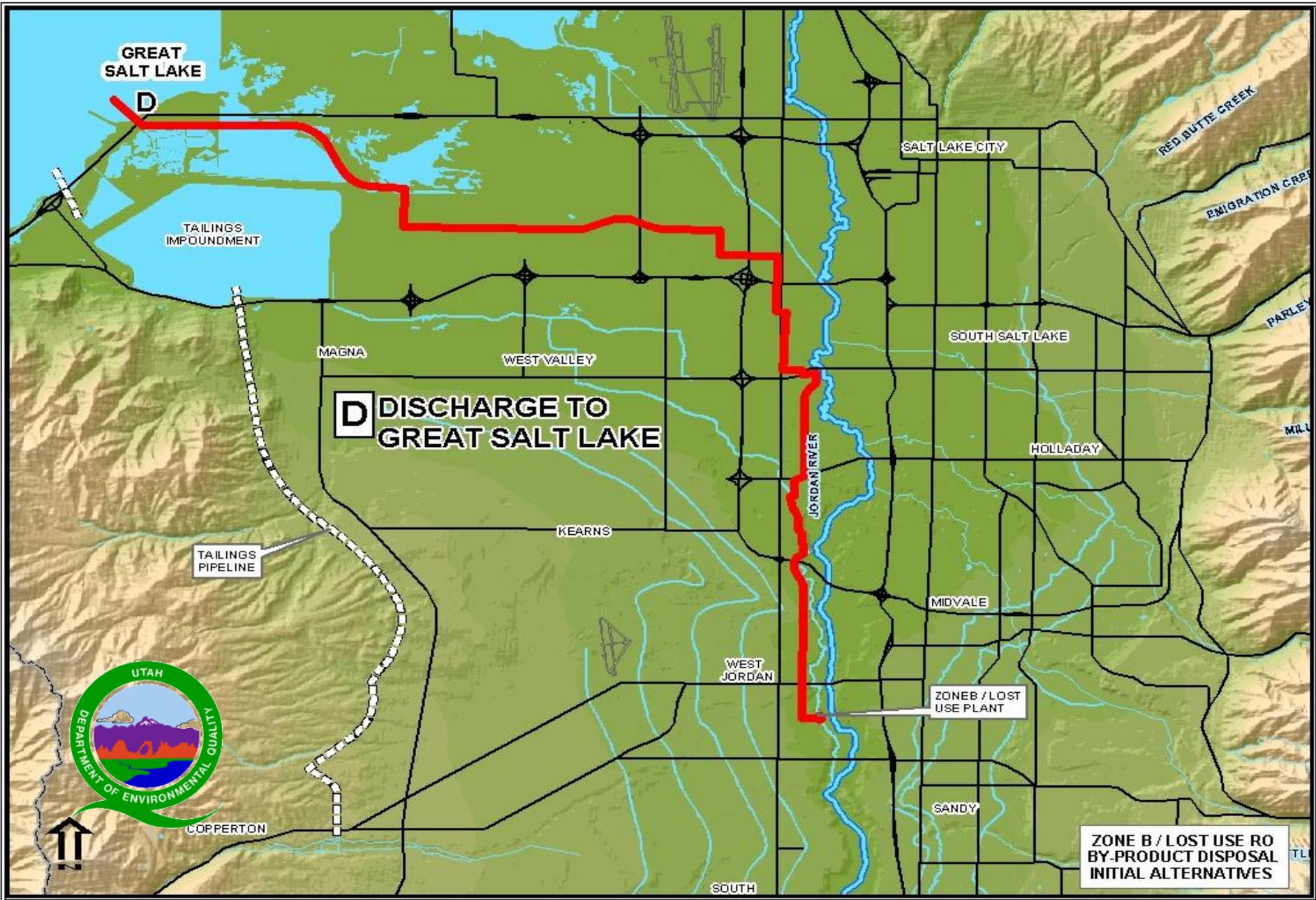


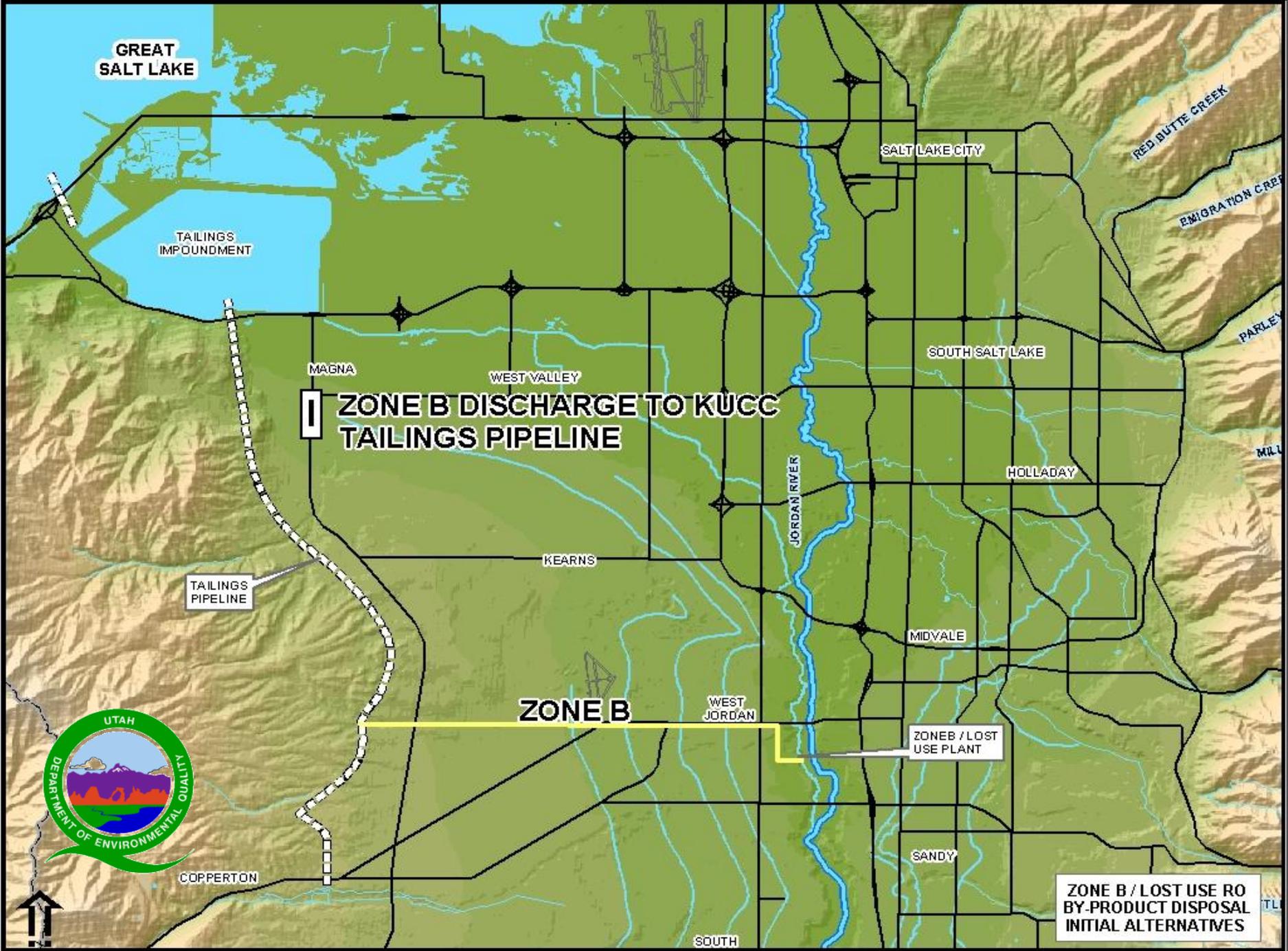
2004 Cost Summary

ALTERNATIVE	Zone B to Tailings Impoundment Lost Use to GSL (F.1)	Zone B to Tailings Impoundment Lost Use to KUCC GSL Outfall (F.2)	Zone B to Tailings Impoundment Lost Use Distillation (F.3)	Zone B to Tailings Pipeline Lost Use to GSL (I.1)	Zone B to Tailings Pipeline Lost Use to KUCC GSL Outfall (I.2)	Zone B to Tailings Pipeline Lost Use Distillation (I.3)
Capital Cost (\$million)	\$15.0	\$15.4	\$18.1	\$11.6	\$12.0	\$14.5
Operating Cost (\$/year)	\$33,000	\$34,000	\$1,125,000	\$79,000	\$ 81,000	\$1,172,000
NPV Cost (\$million)	\$15.6	\$16.1	\$40.4	\$13.1	\$13.6	\$37.7
Additional Capital Cost (\$million)	\$8.6	\$9.0	\$35.3	\$5.2	\$5.6	\$31.3
Unit Cost (\$/acre feet)	\$252	\$256	\$466	\$231	\$235	\$443



(a) Additional capital cost is relative to \$6.4 million





GREAT SALT LAKE

TAILINGS IMPOUNDMENT

SALT LAKE CITY

RED BUTTE CREEK

EMIGRATION CREEK

PARLEY

SOUTH SALT LAKE

MAGNA

WEST VALLEY

ZONE B DISCHARGE TO KUCC TAILINGS PIPELINE

HOLLADAY

KEARNS

TAILINGS PIPELINE

MIDVALE

ZONE B

WEST JORDAN

ZONE B / LOST USE PLANT



COPPERTON

SANDY

ZONE B / LOST USE RO BY-PRODUCT DISPOSAL INITIAL ALTERNATIVES

SOUTH

2004 Recommendations

1. Pursue project with Zone B by-product water discharge to Tailings Impoundment
 - a. Capital cost increase of \$2.9 million

2. Defer Lost Use project components in order to further study by-product discharge effects to the GSL.



2004 Recommendations

3. Assemble and participate in a Selenium studies steering committee
4. Adjust Joint Proposal and project agreements for submission to Trustee



2010 Status

- Completed Great Salt Lake Selenium Studies
 - \$2.4 million
 - Four Years
- Selenium Effects Are Not Observed in Great Salt Lake

2010 Status

- JWCD applies for UPDES Permit to discharge deep and shallow groundwater by-product to Great Salt Lake



JVWCD Listens to Concerns

- Withdrew Jordan River UPDES Permit (2004)
- Five years of project delay to allow for Great Salt Lake selenium studies

JVWCD Listens to Concerns

- Modified treatment plant design to pump all deep groundwater to Great Salt Lake
 - No deep groundwater or by-product discharge to Jordan River

UPDES Permit

(Slide show #2)

